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SCHOOL OF BUSINESS, ECONOMICS AND LAW

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Market Value Implications of Increasing Passive Investing

Abstract

This study examines if recent years' popularity and large inflow of money to passive index funds have led to inflated prices in the Swedish equity market. The problem was investigated by studying the net fund flows to passive funds and comparing them to active funds over time to measure to what extent they affect the market price-to-earnings ratio. To accomplish this, the study uses a linear regression analysis. The final dataset which was examined consisted of historical data on the OMXSPI index and Swedish passive and active mutual funds. The results from the main model were ambiguous and do not support the statement that the growth in passive investment funds influences the overall valuation of the equity market. Due to the regression model not showing a statistically significant relationship, the claim of the so-called passive investment bubble is not likely to exist in the Swedish equity market.

Bachelor's thesis in finance, 15 credits

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Key words

Passive investing, passive investment bubble, active investing, price-to-earnings ratio, Swedish equity market

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1 Introduction

1.1 Background

The recent growth and popularity of passive investment funds has progressed quickly over recent years. A so-called index fund is a form of a passively managed mutual fund or exchange-traded fund (ETF) that invests in a portfolio of securities constructed to replicate, or mimic, a financial market index (Royal, 2023). When index funds first rose to popularity, they were designed to copy the patterns of a specific market index. For example, this was commonly found to be the S&P 500 index (Fernando, 2023). The very first index fund was the Vanguard First Index Investment Trust that appeared in 1975 (Bogle, 1997).

Index funds are found to follow a passive investment strategy (Berk & DeMarzo, 2019). This means that this type of fund seeks to match the risk and return of the market. In turn, because index funds do follow a market index that already exists, they are less volatile than for example managed equity funds (Chapman, 2022). This lowers the overall risk. This idea, that index funds contribute to a general lower risk, is based on the argument that in the long term, the market as a whole will do better, or outperform, any singular investment. Index funds are found to be liked by investors because they provide a sense of ownership over a wide variety of stocks, whilst at the same time promising greater diversification and lower risk. All of this, usually at a lower cost (Berk & DeMarzo, 2019).

Index funds were first introduced to the public in the 1970s. The strategy of investing with the use of passive index funds gained a lot of popularity through the rise of exchange-traded funds (Wigglesworth, 2021). Investors during this period were faced with a choice, to choose between the more traditional route of investing in managed funds, or index funds. Many choose the index fund route, due to the fact that index funds, on average, offer a better average return at a lower cost. Index funds also let the investor, in a sense, own a greater region of the market (Glassman, 2021). More generally, investors who prefer predictable returns and who wish to invest in markets without taking a lot of risks, will choose index funds. Investors who choose to seek higher returns more quickly may choose to invest in actively managed equity funds instead.

The appeal of passive investment funds can be traced to the large amount of money inflows into them over the past two decades (Sushko & Turner, 2018; Tokic, 2019). This is in contrast to the money outflows from actively managed funds (Sushko & Turner, 2018). Two factors that may help explain this shift to passive investment vehicles are that, first, research has shown that actively managed funds tend to underperform on average over the long term relative to an equivalent passively managed fund, and second, passive index funds charge lower fees and thus provide a cost-effective way to invest (Tokic, 2019). Funds with higher fees must, per definition, outperform those with lower fees in order to remain a competitive choice for the investor. Together with an increasing number of passive investment vehicles offered by banks and other financial institutions, and a more informed and cost-wary investor, passive funds provide an attractive choice (Chapman 2022).

1.2 Problem description

Much has been made from the rise of index funds. One argument that has gained popularity in recent years is that its rise has led to inflated prices of the equity market and some even calling it a “bubble” (Tokic, 2019). A stock market bubble arises when investors buy an asset for the sole purposes of selling the asset at a higher price, thus ignoring the underlying fundamentals of the asset (Tokic, 2019). In the context of passive investment funds this bubble has been referred to as the “passive investment bubble” (Tokic, 2019). The argument behind the passive investment bubble comes from the idea that the large amount of money inflows into these funds, which often track an index, lead to a homogenous asset allocation. In other words, the fund must invest proportionally to the index it is trying to replicate, so with more money to allocate, the same assets will experience greater demand and as a result higher prices (Berk & DeMarzo, 2019). For example, a fund that tracks the Swedish OMXS30 market index and invests only in the top thirty largest Swedish companies, must in its objective always invest so that the fund composition is similar to that of the Stockholm index. With more money to dispose of, the fund must invest more into these thirty companies.

1.3 Aim of the study

The purpose of this study is to determine if recent years' popularity and large inflow of money to passive (index) funds has led to inflated prices in the Swedish equity market. This problem will be investigated by studying the net fund flows to passive funds and comparing it to active funds over time to measure to what extent, if any, they affect the market price-to-earnings ratio. Any discrepancies between the two choices of investment approach, i.e., active or passive fund management, may indicate different effects on how the overall market is valued. A secondary purpose will be to investigate using more recent data and for the Swedish market to see what conclusions can be provided compared to previous studies and thus broaden the empirical work that exists in this area.

1.4 Structure of the thesis

The remainder of this study is laid out as follows. Section 2 gives the reader a brief summary of the relevant theories and practices. In section 3, a number of existing studies and discussion papers regarding passive investing are introduced, as well as articles about a so-called passive investing bubble. These together help develop the hypothesis that passive investing affects the valuation of the equity market. Section 4 and section 5 describe the methodology and data collection process, respectively, for testing the hypothesis. The results of the test are summarized in section 6, and then analyzed in section 7. Finally, the study is concluded in section 8.

2 Theory

2.1 Portfolio diversification

Diversification involves spreading out the risk of investments, by investing in various classes of securities, sectors of the economy and even geographical regions. The goal of portfolio diversification is to increase a portfolio's general overall expected return, whilst at the same time reducing the risk (Berger, 2022). This is possible because when one asset in one market does worse, and one asset in another market does better, there is a cushion provided to the portfolio, making the losses less off putting in a sense (Berk & DeMarzo, 2019).

2.2 Portfolio management

Portfolio management is the act of selecting and overseeing a group of investments that meet the long-term financial objectives and risk tolerance of the investor. To form and create the portfolio, the Portfolio Manager will create a plan to meet the goals of the investor. The entire process of creating a portfolio, and putting together the right combination of different assets is done to achieve a profitable investment mix (Berk & DeMarzo, 2019).

There are many goals of portfolio management. For example, capital appreciation. This refers to the difference between the purchase price and the selling price of a security (Berk & DeMarzo, 2019). Capital appreciation can happen in many ways, even without the investor taking any acting charge, and may occur passively and gradually. In our context of portfolio management, capital appreciation does refer to an increase in the value of long term growth, with focus on the initial amount invested and how it increases over a longer period of time (Rosen & Gayer, 2014).

Another example of portfolio management is allocating resources properly. This refers to gaining knowledge of what securities to invest in, at what time, and in what different markets. It is also important to distinguish the scope of the portfolio and to what extent risks can be identified and valued (Hayes, 2023).

2.3 Passive portfolio management

A passive portfolio management, has the aim to duplicate the return of a particular market or index. Through the use of passive portfolio management, the investors are more inclined to invest in index funds that have low but very steady returns, and are more profitable in the long run (Tamplin, 2023). Passive portfolio management builds also on the idea that the market provides all the information needed to form the price of the securities (Field, 2022).

There are many positives and negatives when investing using passive portfolio management. One main key benefit that is often associated with passive portfolio management is the low fees associated (Field, 2022). Oversight over the securities is much cheaper than that if everyone were to be buying the same stocks at the same time. Since passive portfolio management follows an index and uses it as a benchmark, this is avoided (Berk & DeMarzo, 2019). Another key benefit of investing using passive portfolio management is transparency. Again, since passive portfolio management copy and replicate an index, it is almost always visible to the investor which assets are to replicate. It is clear to the investor which assets are found in an index fund (Tamplin, 2023). Another benefit associated with passive portfolio management is the simplicity. Investing and owning an index, or even group of indices, is a lot more manageable and easier for an investor to understand (Chen, 2021).

There are also drawbacks found with passive portfolio management. One main negative side to passive portfolio management is that they can be too limited. Meaning, since they follow an already established index, they are predetermined, and thereby are investors allowed very little room to variance. No matter what happens in the market, the investors are almost forced to be locked into their securities (Berk & DeMarzo, 2019). Another negative side to passive portfolio management is the smaller potential returns. It is the securities which drive investors, even though passive funds will almost never beat the market. Lastly, passive portfolio management is subject to total market risk (Tamplin, 2023). This is a drawback because index funds follow an entire market, when the overall prices of stocks and other securities fall, so do the index funds. There is very little room for defensive measures when this happens (Chen, 2021).

2.4 Active portfolio management

Another investment strategy often used by investors to generate return is active portfolio management. Active portfolio management is built on a strategy of buying and selling stocks in an attempt to outperform a specific index or benchmark (Berk & DeMarzo, 2019). The general objective by using active portfolio management is to beat the market. In order to successfully fulfill this objective, one must pay close attention to market trends, political factors, shifts in the global and national economy and any other factors which may specifically affect companies (Dubner, 2021).

Generally, active portfolio management requires buying and selling of assets in a fast manner in order to outperform a benchmark or index. Investment decisions and choices need to be made fast in order to keep up with the desired benchmark or index (Dubner, 2021). Therefore, active portfolio management often strives for larger returns, than for example passive indexes, but take greater risks and often entail larger fees (Berk & DeMarzo, 2019). These factors are what often draw investors to choose the passive portfolio management route instead.

2.5 Price-to-earnings ratio

The price-to-earnings ratio, or more commonly known as the P/E ratio, is used by investors to compare the prices of companies stock to the earnings that the company has (Berk & DeMarzo, 2019). This comparison is made so that an understanding of whether markets are overvaluing or undervaluing a stock. The P/E ratio is also used by investors to compare the valuations of individual or entire stock indexes (Berger, 2023).

The P/E ratio can be calculated by dividing the price of a stock by the stocks total earnings (Berk & DeMarzo, 2019), see formula below:

$$P/E \text{ ratio} = \frac{\text{Market share price}}{\text{Earnings per share}}$$

Notably, by only looking at the market price of the stock, then this will only convey how much individuals are willing to pay for the share. However, when you also incorporate earnings per

share, then this ratio is also able to tell the investor whether the price accurately reflects the company's earnings potential (Marquit, 2023).

Calculating the P/E ratio can be calculated through different approaches. These approaches mainly focus on changing the Earnings Per Share portion of the ratio. There are three variants of the P/E ratio, including the *Trailing Twelve Month (TTM) Earnings*, *Forward Earnings*, and lastly *The Shiller P/E Ratio* (Berger, 2023).

Trailing Twelve Month (TTM) Earnings

This approach uses the company's earnings over the past 12 months, and it is mainly used in the evaluation of different companies. This method is beneficial, and widely popular by investors as it is able to factor in the past earnings, and thereby uses actual and reported data (Berger, 2023).

Forward Earnings

Opposite to the TTM method, the P/E ratio can also be calculated by using historical data. Although this method is not as accurate as it is not based on actual and reported data, it does use the best and more up-to-date data available to suggest how a company will perform in the future (Berger, 2023).

The Shiller P/E Ratio

The last approach is The Shiller P/E Ratio. This approach applies to the average earnings over a period of time. It is calculated by dividing the price by the average earnings over the past X amount of years (Berger, 2023). It is very commonly used in measuring the P/E ratio for the valuation of the S&P 500 Index, for example.

P/E ratio vs earnings yield

There is a wide and constantly ongoing discussion as to how the P/E ratio and the earnings yield are very closely related. The two measures are indeed very similar. However, the earnings yield is calculated by taking the earnings of a stock and dividing it by the stock's current price, and where the P/E ratio is instead calculated by dividing the price of a stock by its earnings (Berger, 2023). The earnings ratio is expressed as a percentage of the stock's price.

Many studies and theories suggest that the earnings yield is indeed a very reliable indicator of stock price movements, however mainly so in the short term (Marquit, 2023).

3 Previous research

3.1 Literature review

Source of Inspiration: The implications of passive investing for securities markets

This study by Sushko and Turner (2018) discusses the implications of passive investing for securities markets. The authors begin by discussing the popularity of passive investing through index mutual funds and ETFs. Investors are beginning to shift their attitudes towards passive investing, and this will in turn also affect the securities markets. Sushko and Turner (2018) argue that the securities market will be affected in two key ways in their study:

1. Their first argument is that it could result in a higher correlation when it comes to returns and less security-specific price information.
2. Their second argument is that this shift in popularity can also affect the investment fund flows and market price dynamics.

Sushko and Turner (2018) outline the recent growth of passive investing between 2007 and 2017. In 2017, passive funds (including ETFs) made up around 20% of the global aggregate assets under management. This was a near doubling in percentage terms from a decade before. Similar growth was experienced by passive funds in terms of their share of the total investment funds focusing on equity that are available to end investors: in the U.S., index investing made up nearly 45% in 2017, up from nearly 20%; and in Europe nearly 30%, up from 15%. This change is illustrated by the cumulative net inflows into passive investment funds, as opposed to the net outflows from their active counterparts. In other words, investments in passive funds are replacing investments in active ones. However, despite this shift to passive investing, “their holdings as a share of total outstanding securities remain at a relatively low level due to the sizable holdings of other (non-fund) investors” (Sushko & Turner, 2018, p. 115). Instead, when measuring passive funds’ share of the total equity trading volumes, it accounted for only around 3% in Europe, and around 15% in the U.S. As such, “a key observation is that, despite their rapid growth, passive funds account for a relatively small fraction of outstanding securities” (Sushko & Turner, 2018, p. 114). This in turn “suggests that any effect on security prices and issuers may

not be large. However, the effects could become significant if the passive fund management industry continues to expand.” (Sushko & Turner, 2018, p. 129).

Importantly, the authors point out that distinguishing between active and passive investing strategies is in practice troublesome. “The risk of outflows if [actively managed funds] underperform their benchmark leads many active funds to avoid portfolios that deviate substantially from those of the market index.” (Sushko & Turner, 2018, p. 115-116). In other words, many active funds’ managed portfolios are indeed similar to those of passive funds. Cremers et al (2016) referred to this practice as “closet indexing” in comparison with “explicit indexing”.

Sushko and Turner (2018) argue that one factor that helps explain the recent growth in passive investing is the superior performance of passive funds over active funds over time. “After fees and expenses, most active equity funds have failed to outperform the market benchmark in recent years” (Sushko & Turner, 2018, p. 117). Furthermore, “funds that outperformed their benchmark have not done so consistently.” (Sushko & Turner, 2018, p. 117).

The Passive investment bubble

Tokic (2019) discusses the “bubble” that is allegedly present in passive investing, and the possible consequences which may arise with it in this editorial. Tokic (2019) begins by explaining what the “bubble” is. He explains that a bubble is referred to as a “valuation phenomenon” and occurs when an asset's price dramatically exceeds the asset's real value. He argues that the bubble starts to happen when people start to buy securities with the “sole purpose of reselling that asset at a higher price, without any regard for the asset’s fundamental value.” He explains that this process, over time, leads to a trend of rising prices that attracts more of the trend followers, who in turn push the prices even higher. Eventually, the price of the asset will reach the bubble phase. The bubble phase will last for however long investors keep buying and pushing up the price, until it will eventually collapse as the trend shifts and all the trend followers exit at the same time.

Tokic (2019) then goes on to argue how, “the efficient market hypothesis (EMH) rules out the financial asset price bubbles”. EMH has a key argument which is based on the existence of rational arbitrageurs. Rational arbitrageurs buy undervalued assets and then sell overvalued assets. Therefore, a market which is dominated by rational arbitrageurs which behave in this way, will remain efficient. This disproves the bubble.

Tokic (2019) concludes with discussing the consequences of the passive investment bubble. He believes that when the next recession comes, investors “will start to reallocate back to active investment managers as major indices start to decline, which will exert heavy indiscriminate selling pressure on the stock market over an extended period of time.” This means for investors that when they attempt to recover and sell their ETFs or reallocate back to active managers, the market will likely mirror a sharp sell off.

Hidden Power of the Big Three?

Fichtner et al (2017) explore the big change that can be noted towards passive investment strategies. The journal article discusses that the passive index fund industry has greatly at large been dominated by BlackRock, Vanguard and State Street. These three make up 88% of the S/P 500 firms. The study explores the incentives investors may have to act passively, and what power this gives them in the marketplace.

According to Fichtner et al (2017), passive investors are more inclined to have little shareholder power because they cannot leave, or “exit”, whenever they choose to, since they follow an already existing index. However, a passive investor with passive investment strategies have many “hidden powers” which can make them more successful in the long run. This journal article further explores this, along with the other incentives that are present for passive index funds and why people would be interested in investing in them.

Passive investment blamed for inflating stock market bubble

In this article, Johnson (2021) discusses the findings of the research done by Vincent Deluard, a global market strategist. His research indicates that passive investment has contributed to higher

U.S. equity prices, specifically for larger companies, and prevention of sustained bear markets due to the sheer size of the passive investment sector.

Deluard analyzes how the S&P 500 stock market index has fared in terms of a cyclically adjusted price-to-earnings ratio, also known as the Shiller P/E, before the advent of the first U.S. ETF (SPY) in 1993 and afterwards. The results are that before 1993 the Shiller ratio trend was relatively stable at around 15. Since after the launch of SPY, the same trend has risen sharply. One should have in mind, though, that the time horizons before and after are noticeably different, and as such there may be many things that could affect this change. Indeed, Deluard states that other factors such as unprecedented low interest rates and expansionary monetary policy in the form of quantitative easing have likely played a large role in higher asset valuations. However, Deluard sees still a clear contribution from the passive investment.

Has Passive Investing Become Fraught with Risk?

This article by Divine (2019) discusses the problems with passive investing from the perspective of Michael Burry. The article begins by giving some background as to what index funds and ETFs are, and why they have gained such popularity since 2009. They argue that index funds have risen in popularity due to their simplicity, safeness, and are arguably the cheapest way to diversify your risk.

The article includes an interview with Michael Burry who is a “Wall Street legend”. He is warning of a bubble in the index funds and passive investing. He says that this bubble will come with a lot of risk and can be uncanny to many investors.

The article concludes with key takeaways from the interviewer to an individual investor. The author of the article contests against Burry's claims, saying that the risk of people not being able to find willing buyers for normal, mainstream stocks, is unrealistic. This is because in Burry's situation, there is a requirement of a long-term situation where everyone is selling their stocks at once. This situation will not present itself, according to the author, as it does not agree with the idea that is behind passive investing.

The Big Short's Michael Burry Sees a Bubble in Passive Investing

This article by Kim and Cho (2019) reports on investor and hedge fund manager Michael J. Burry who sees value opportunities in small cap stocks following what he sees as a passive investment bubble. “The bubble in passive investing through ETFs and index funds as well as the trend to very large size among asset managers has orphaned smaller value-type securities globally”, Burry states.

3.2 Hypothesis

Drawing on the analysis and discussion by Sushko and Turner (2018) and Tokic (2019), specifically on the shift towards passive investing and the so-called passive investment bubble, this paper will examine the possible effect that comparatively increased investing in passive funds relative to active funds (as measured by the cumulative net fund flows) has on the valuation of the general Swedish equity market. As such, two tests will be conducted. The first test will test if the net fund flows into passive funds affects the market price-to-earnings ratio. The second test will test for flows into active funds. The two hypothesis tests are set up as follows:

H_0 : Net fund flows to passive mutual funds do *not* have an effect on the market P/E ratio

H_1 : Net fund flows to passive mutual funds do have an effect on the market P/E ratio

H_0 : Net fund flows to active mutual funds do *not* have an effect on the market P/E ratio

H_1 : Net fund flows to active mutual funds do have an effect on the market P/E ratio

If a passive investment bubble exists in Sweden, then at the very least the net flows to passive funds must have a statistically significant relationship and its null hypothesis be rejected. And intuitively its coefficient being greater than that of active fund flows since the industry share of passive funds being generally smaller (Sushko & Turner, 2018).

4 Method

The thesis will be based on a quantitative method. The data used in the analysis will be based on the total inflows and outflows of funds to the total assets under management for passively as well as actively managed funds on offer by selected financial institutions. Data will also be collected on equity prices for the Swedish market and for relevant indices, as well as for selected market price indicators.

The analysis of the data will be based on an ordinary-least-squares (OLS) regression in order to investigate possible causal relationships between equity market price levels, and the prevalence and wealth of passive index funds as compared with funds with an active allocation strategy.

The analysis will draw on similar studies for the U.S. market, and apply it to the Swedish setting. For example, to see if the stock market is overvalued by analyzing a price-to-earnings ratio over time, and compare with how that has changed with the rise of index funds and before.

4.1 General methodology

In order to determine the effect that fund flows to passively managed mutual funds has on the valuation of the stock market, we utilize a linear regression model. The model was inspired by the source of inspiration to this paper: *The implications of passive investing for securities markets*. In this study, Sushko and Turner (2018) discuss and study the growth of passive investing from 2007-2017, and what has caused this change. Although Sushko and Turner (2018) did not include a linear regression model in their study, they discussed many factors like unemployment rate, interest rate, growth rate as well as the capital flows to passive and active index funds. Therefore, to further investigate what Sushko and Turner (2018) discussed and analyzed, the model used in this study was created. The factors that Sushko and Turner (2018) discussed were placed as control variables and dependent variables in the following study.

We estimate this possible causal relationship using the ordinary-least-squares (OLS) method. For this method to be feasible, the OLS conditions one to four have been met. These are the functional form, exogeneity, full rank and random sampling assumptions. Furthermore,

multicollinearity between the independent variables have been tested for and controlled. The model test has been implemented in Stata 17.

4.2 Model specification

The selected model has the following specification:

$$PE_{i,t} = \beta_0 + \beta_1 pssv_{i,t} + \beta_2 actv_{i,t} + \beta_3 rate_{i,t} + \beta_4 unem_{i,t} + \beta_5 infl_{i,t} + \beta_6 grwt_{i,t} + \varepsilon_{i,t}$$

where $PE_{i,t}$ denotes the historical price-to-earnings ratio for the OMXSPI; $pssv_{i,t}$ and $actv_{i,t}$ denote the monthly net fund flows to passively and actively managed mutual funds, respectively; and $rate_{i,t}$ denotes the monthly average of 10-year Swedish treasury bonds, acting as a proxy for the market interest rate. The variables $unem_{i,t}$, $infl_{i,t}$, and $grwt_{i,t}$, denote the monthly unemployment rate, the inflation rate, and the monthly GDP growth rate, respectively, in Sweden. Finally, $\varepsilon_{i,t}$ denotes the standard errors of the model. For all variables, t denotes the time as the end-of-month value.

4.3 Variable description

Table 1 lists the variables used in the model.

Table 1 **List of variables**

This table lists the dependent and independent variables and gives a brief description.

Variable	Description
pe	Monthly historical price-to-earnings ratio for the OMXSPI index
pssv	Net monthly fund flows to passively managed mutual funds
actv	Net monthly fund flows to actively managed mutual funds
rate	Average monthly yield of 10-year Swedish treasury bonds
unem	Annual Swedish unemployment rate
infl	Annual Swedish inflation rate as per change in consumer price index
grwt	Annual growth rate in the Swedish gross domestic product

OMXSPI historical P/E ratio

The dependent variable is the historical monthly P/E ratio for the OMX Stockholm PI (OMXSPI) equity market index. This index was chosen as a proxy to represent the entire Swedish stock market. The index contains circa 300 of the largest companies listed on the Stockholm stock exchange Nasdaq. The price-to-earnings (P/E) ratio is a widely used valuation multiple both in theory and in practice. It relates the price per share of a company to its earnings per share. On a company level, a small P/E value indicates a cheaper company, and a higher P/E value indicates a more expensive one. These valuations also categorize companies into “value” and “growth” companies. The P/E ratio for an individual company is calculated by:

$$P/E \text{ ratio} = \frac{\text{Market value per share}}{\text{Earnings per share}}$$

In order to obtain the index equivalent, each company’s P/E ratio is multiplied by the company’s weighting in the index. In the case of OMXSPI, the weighting is done on a price-basis—not a

market capitalization basis. On a market level, a small P/E value indicates a cheaper general equity market, and conversely, a higher value indicates that the stock market is more expensive.

Net monthly flows to passive funds

The variable of interest in this research is the net inflow of capital to passively managed mutual funds. It represents the difference in the amount of money that each month is invested in and withdrawn from mutual funds that buy Swedish companies. The flows are denominated in billion Swedish krona. The decision not to log transform the monthly flows are based on two factors. First, the P/E ratio is normally not referred to in percentage terms but in absolute terms. For example, referring to a company's P/E is always given in number terms—not relative terms—as, say, 14. Second, since many observations in the dataset have negative values, it is preferable to avoid log transformations as the necessary mathematical manipulations may make the interpretation of the effects harder.

In this calculation, it is important to note that reinvested distributions from dividends and capital gains are removed from the calculation, as they have little to nothing to do with the assets. A share-based calculation, like the one used in this case, is able to include all shares including those created to design dividend and capital gains.

Net monthly flows to active funds

The second variable of interest used in this model is the monthly net flows to actively managed mutual funds. Its calculation and interpretation is the same as for the passive funds mentioned above, but for actively managed funds.

Control variables

The first of four control variables is the interest rate. Here, the monthly average yield of 10-year Swedish treasury bonds was taken as a proxy. The interest rate should be included in the model because of its impact on asset prices. As Warren Buffett famously quipped “interest rates are to asset prices... [what] gravity is to the apple”.¹

¹ Berkshire Hathaway Inc. annual shareholder meeting, morning session (2013).

The economic growth, inflation rate, and unemployment rate were added as control variables in the model due to the impact business cycle has on asset prices. These three control variables represent the macroeconomic factors which impact the business cycle. The business cycle consists of economic activities and intervals of expansion, of which are followed by a recession. The movement of macroeconomic variables are usually what characterize a business cycle. Therefore, these macroeconomic variables were included in this model as control variables, in order to represent the business cycle, and its effects on the asset prices. Growth was measured by taking the historic Gross Domestic Product (per month) for Sweden. The Swedish inflation rate was also included and was extracted per month. Lastly, the unemployment rate was also included, also retrieved per month. These control variables were all collected from the Swedish state statistics provider, Statistiska Centralbyrån (SCB), and were added to isolate the possible causal relationship between the main variables of interest and the dependent variable.

4.4 Supplementary model testing

Numerous tests on the developed model were performed to establish its practicality. First, concerning the standard errors of the regression model, a Breusch-Pagan test for heteroscedasticity was performed. The results of the test showed no presence of heteroscedasticity in the data set (see Appendix A). As such, the output of the regression model can be interpreted as is and without the need of setting the model with robust standard errors. Nevertheless, the model with robust standard errors was chosen for its generally more cautious approach. Second, a test for multicollinearity was subsequently conducted. This test ensures that there is no significant correlation between the independent variables that would violate their independence. In the absence of correlation, each variable provides new and independent information about the dependent variable. The results of this test revealed near-zero to moderate levels of correlation between the independent variables (see Appendix A).

5 Data

5.1 Retrieving the sample

The data collected is primarily sourced from Refinitiv Eikon, Refinitiv Datastream, and Refinitiv Lipper Fund services. Refinitiv offers a database which allows financial professionals to gather, monitor, and analyze financial information. The database provides data on real time market data, news, fundamental data, analytics and trading tools. The decision to use Refinitiv was made because they are one of few financial services that offer comprehensive data concerning the Swedish mutual fund market.

The sample was chosen based on five criteria: asset type, asset universe, domicile, geographical focus, and management approach. Since we are investigating effects on the stock market valuation we filter on equities only, and thus exclude investment vehicles that are mixed asset, e.g., invests in multiple asset classes, including such that are equities and bonds. The asset universe chosen was restricted to open-end mutual funds only as the prevalence of ETFs in the Swedish market is still relatively small and the available data limited. Both domicile (where the asset is registered) and the geographical focus (where the fund invests) are set to Sweden. And finally, the management approach is sorted on active and passive management. This filtering yields 190 actively managed funds and 42 passively managed funds.

From this selection of funds, we retrieve historical data on net asset value (NAV), total net assets (TNA), and net fund flows. NAV measures a fund's assets minus liabilities on a per share basis, and TNA measures the total net assets that a fund disposes of. From these measures, the monthly net fund flows can indirectly be obtained. Included here are both funds that are currently in operation and those that have closed down. This is to overcome a potential survivorship bias. Unfortunately, for some funds Refinitiv does not offer historical data on fund flows or the various necessary inputs in order to calculate it. Thus, the sample contains a total of 30 passive funds as of the beginning of 2023, with less going back in time due to their inception dates varying in time. For active funds, more data was available.

In the case of funds offering several classes of issue, say, an A, B or a C class, all of them were included in the sample as their flows, too, matter for the analysis. Omitting the various classes would lead to inaccurate and potentially misrepresentative monthly fund flows, depending on their size.

The historical P/E ratio is provided by Refinitiv as the provider of the index, namely Nasdaq, does not offer it themselves. The calculations behind it are done by Refinitiv and not by us due to a lack of necessary data. The P/E ratio is thus on a month-end basis. For the interest rate, the 10-year treasury bond yield was obtained on a monthly average basis from SCB.

5.2 Cleaning the data

From the original raw data collected from Refinitiv Eikon, certain adjustments had to be made. For the missing observations where data existed on the month before and after, the average of the two was taken. This primarily had to be done for NAV and TNA. For the funds where data on monthly net fund flows did not exist, flows were calculated as follows:

$$\text{Percentage change due to market} = (\text{This month's NAV} - \text{Last month's NAV}) / \text{Last month's NAV}$$
$$\text{Change due to market} = \text{Percentage change due to market} * \text{Last month's TNA}$$
$$\text{Change due to flow} = (\text{This month's TNA} - \text{Last month's TNA}) - \text{This month's change due to market}$$

Using this methodology, the effect of changes in market prices can be eliminated and only the change due to money flows remain. The calculations are based on the same procedure as that of Lipper FMI Money Flow Reports, but on a monthly basis rather than weekly.² This provides consistency across the data.

² Refinitiv Lipper US Fund Flows. Last retrieved on 2023-04-19 from https://www.lipperusfundflows.com/php/about_ff_calc.php

5.3 Summary statistics

Flows from a total number of 104 funds were collected, of which 30 are passive and 74 are active ones. Table 2 summarizes the sample data.

Table 2 **Summary statistics**

This table displays summary statistics for the variables within the dataset. All observations are collected on a monthly basis from April 2005 to March 2023, numbering 216 months in total.

Variable	Obs	Mean	Std dev	Min	Max
Price-to-earnings ratio	216	13.75	2.41	7.34	21.02
Passive net fund flows ¹	216	0.64	2.34	-8.06	24.38
Active net fund flows ¹	216	-0.04	2.51	-10.40	7.33
Interest rate ²	216	1.85	1.40	-0.36	4.45
Unemployment rate ²	216	7.63	1.08	5.30	10.30
Inflation rate ²	216	1.78	2.40	-1.90	12.30
GDP growth rate ²	216	0.49	1.26	-4.02	4.33

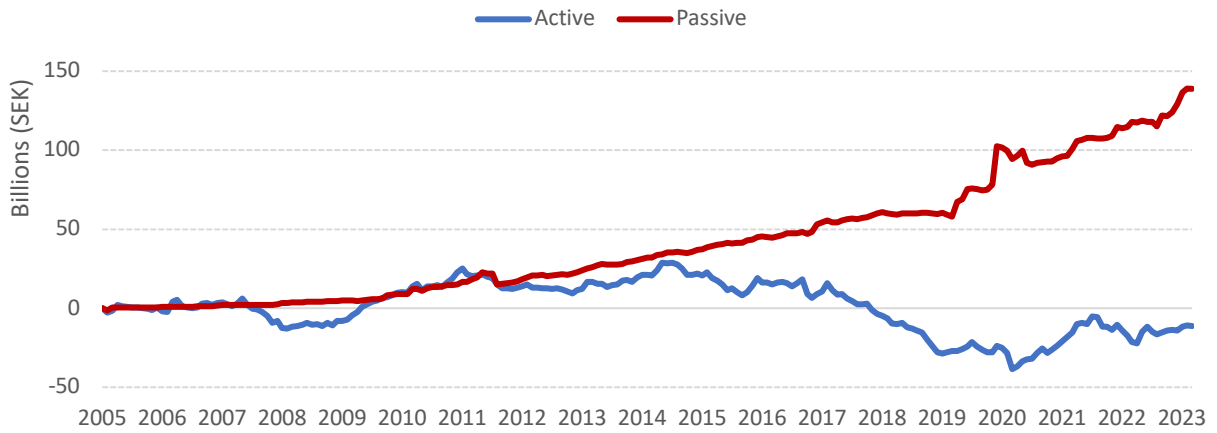
¹ Variables defined in billion Swedish krona

² Variables defined in percentage units

The monthly cumulative net fund flow to actively and passively managed mutual funds are depicted in figure 1. As the graph illustrates, over the last two decades there has been a net shift in asset allocation towards passively managed mutual funds.

Figure 1 Monthly cumulative net fund flows

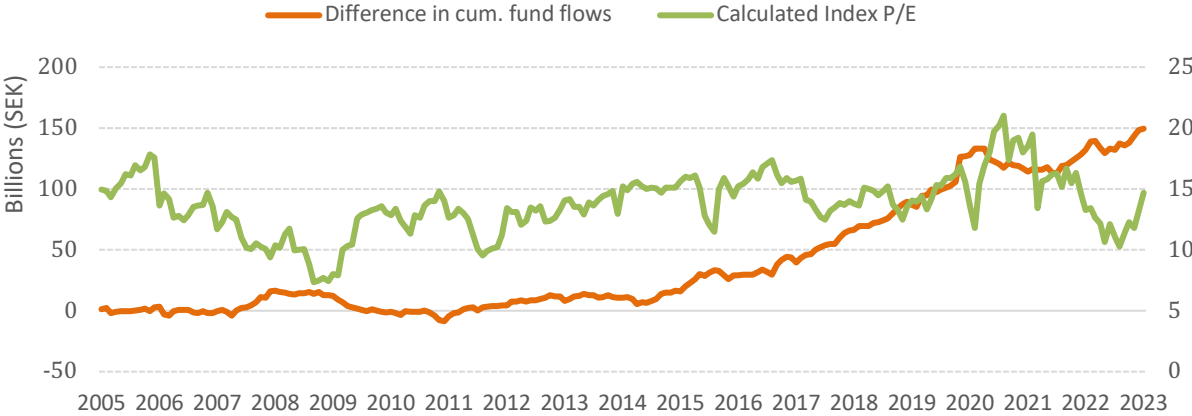
This graph shows the monthly cumulative net fund flows to actively and passively managed funds for the last eighteen years. Note that the smaller number of passive funds renders its trend more vulnerable to individual funds' flows. For example, around the year 2020 there is a considerable net inflow to passive funds. The greater number of active funds is more likely to cancel out such idiosyncrasies.



Next, by taking the difference between the two fund flows and comparing it with the price-to-earnings ratio, a possible relationship can be visualized. This is shown in figure 2 below.

Figure 2 **Difference in monthly cumulative net fund flows, and P/E ratio**

This graph shows the difference in monthly cumulative net funds flows and the price-to-earnings ratio over time. The difference in cumulative net fund flows (lhs) is defined as the monthly cumulative net flows to passive funds minus the monthly cumulative net flows to active funds. This shift to passive investing is compared with the market price-to-earnings ratio (rhs) over time.



Upon visual inspection, no larger change in the P/E ratio as a result of increased investing in passive funds (or divesting from active funds) can be seen.

6 Empirical results

6.1 Expected results

Previous research in the U.S. on the implications of passive investing on security prices has indicated that “[a]t this point, the relatively small share of passive fund portfolios in total securities market holdings suggests that any effect on security prices and issuers may not be large. However, the effects could become significant if the passive fund management industry continues to expand.” (Sushko & Turner, 2018, p. 129). For the Swedish market, we expect to find similar results. However, the proportion of passive investment vehicles may very well be different in these markets compared to the U.S. market.

Other research by Vincent Deluard has indicated that higher U.S. equity prices for mainly larger companies is caused by passive index funds (Johnson, 2021). This, Deluard argues, has partly been explained by the shift from active to passive index investing, but not solely. Other factors attributed to a higher price level are lower interest rates, and the large asset buying programs by central banks.

6.2 Regression results

The regression was run on time series data and set to 90, 95, and 99 percent confidence levels. A test for joint significance was conducted and concluded that the models as a whole are statistically significant. The results of the regressions are presented in table 3.

Table 3 **Regression output**

The table shows the effects of the independent variables on the price-to-earnings ratio. Two models were tested, the first model (1) with the variable passive net fund flows, and the second model (2) without it. Note that in both instances the largest effect on the P/E ratio is attributed to the interest rate.

	Change in P/E ratio (1)	Change in P/E ratio (2)
Passive net fund flows ²	0.038 (0.92)	N/A
Active net fund flows ²	0.148*** (3.01)	0.161*** (3.40)
Interest rate ³	-0.931*** (-10.52)	-0.942*** (-10.91)
Unemployment rate ³	0.251** (2.16)	0.243** (2.12)
Inflation rate ³	-0.193*** (-3.17)	-0.187*** (-3.07)
GDP growth rate ³	0.400** (2.58)	0.405*** (2.61)
constant	13.687*** (14.63)	13.783*** (15.06)
Observations	216	216
R-squared	0.458	0.457
Period	2005-2023	2005-2023

¹ *t*-values are in parenthesis

² Variables defined in billion Swedish krona

³ Variables defined in percentage units

⁴ *, **, *** denotes variable significance at the 0.10, 0.05 and 0.01 significance level, respectively.

The empirical findings indicate that the net fund flows to passively managed mutual funds have a positive effect on the P/E ratio. However, as table 3 shows the variable is not statistically significant. Therefore, no conclusion can be drawn based on the present data set as to what the true effect, if any, on the P/E value is. Based on these results the first null hypothesis cannot be rejected.

The model output also shows that the net fund flows to actively managed mutual funds have a positive impact on the equity market price-to-earnings ratio. In other words, the more money flowing into these funds, the pricier the equity market becomes. The impact, however, appears not to be substantial at the observed net fund flow levels. According to the model, for each billion invested in the actively managed fund industry, the P/E ratio rises only by 0.15 units. Here, there is sufficient data to conclude that this relationship holds, and as a consequence we reject the second null hypothesis.

Unsurprisingly, the largest impact on the P/E ratio is attributed to the interest rate. For each percentage unit increase in the yield for 10-year Swedish treasury bonds, the market P/E ratio drops by 0.93 units. As expected, the model output confirms the inverse relationship between prices (even when put in relation to earnings) and interest rate.

Regarding the remaining control variables (those typical of a business cycle), all are statistically significant. The effect of inflation is similar to that of interest rates, although less effectful. As anticipated, economic growth generally fuels asset purchases and investing and as such lead to increasing prices, including a higher P/E ratio. Less anticipated, however, was a positive relationship between the Swedish unemployment rate and the P/E ratio.

Another model was added, where the insignificant variable (pssv) was removed. The purpose of this was to investigate the robustness of the original model. As the two models are almost identical to one another, the original model is deemed to be robust.

7 Discussion & Analysis

7.1 Results

The results of the model are that large fund flows into actively managed funds have an effect on the valuation of the equity market, whereas flows to passively managed funds do not. There are several possible reasons for this. First and foremost, funds that are classified as actively managed still constitute a significantly larger portion of the total mutual fund industry as opposed to passive funds, and any aggregate net flows into active funds will have a significantly greater impact on equity prices as a result. For example, the data set only contains fund flows for thirty passively managed funds after exhausting Refinitiv's database; many of which were launched only in recent years, highlighting both the limitation in the number of passive funds, as well as the recent surge in the passive fund industry. This is in contrast with flows for seventy-four active funds (the majority of which also manage larger wealths) that sufficed to show a comprehensive trend but with many more available. It is therefore likely that the few number of passive funds in existence in the early stage of the observed time period, lead to a trendline that is more volatile than one with many funds observed as the aggregate inflows and outflows cancel each other out. This in turn leads to a trend that is more exposed to the flows of an individual fund. And for the more recent years, as more passive funds are launched, inflows notably exceed outflows. Yet no significant increase in the P/E ratio is observed during this period and therefore no noticeable relationship between the two can be seen.

Indeed, the regression model could not show a statistically significant relationship. Based on this result it is fair to conclude that at this stage the growth in passive investment funds and the shift in flows from active to passive funds have not had an effect on the overall valuation of the Swedish equity market. As such, any claim of a so-called passive investment bubble with an accompanying impact on market valuations is unlikely to exist; at least for now. In line with the reasoning of Sushko and Turner (2018), it may be that with the continued growth in the passive fund management industry, there could develop a significant effect in the future. What that effect could look like, other than the general market valuation, would be an interesting topic for future research.

It is important to note that while the coefficient for fund flows into active funds is positive—a relationship that most likely holds true, as more investment yields higher prices due to higher economic demand—the magnitude of the coefficient is subject to uncertainty. The main reason for this is simply that other asset types like pension funds, endowments, hedge funds and private equity, are left out of the sample. Some of which, in particular pension funds, are of significant sizes. This, however, is not the case for passively managed funds as they are primarily found amongst the mutual fund industry. The reader is reminded that it was not within the scope of this study to accurately measure the change in the market price-to-earnings ratio from changes in fund flows, as there are too many variables to consider that affect security prices, but merely to examine the existence and comparable magnitudes of their respective effects with a particular interest in passive funds. In that respect, the size of the actively managed mutual fund industry and flows therein appear to play a significant role in causing movements in the valuation of the equity market. Conversely, the role of the passive fund industry appears not to be significant.

A word of caution is in order here. It may be the case that correlation need not mean causation. This fallacy is at least conceivable for the variable active fund flows. One argument that springs to mind is that investors invest more heavily into mutual funds when the market experiences increasing prices, and that there are other variables omitted from this model that together cause greater movement in the P/E ratio than does flows into active mutual funds. In such an event, net inflows would follow market prices (or the omitted variables) to a greater extent than vice versa. Nevertheless, it is the authors' belief based on the aforementioned reasons that fund flows are a causal driver here, but the potential problem was not explored for this study.

7.2 Limitations

One key limitation to be aware of is that of the dataset. This meaning that a longer run study would have been more ideal. Our dataset only includes values going back to 2005. Of course, a longer run study, with historic data available reaching as far back as possible, would have indicated more accurate results. However, we were not able to overcome this limitation due to historic data not being available. Another potential flaw associated with this limitation is that not all of the funds included in the OMXSPI index have data that started at the same time. For

example, for some indexes their data began first in 2005, whilst for newer indexes, their data began later 2007. Also, it would have been more ideal to have a complete data set which included data on all of the funds in the chosen index. Refinitiv did not have all of the data available for all of the funds present in the OMXSPI index. Therefore, the sample used in this study may not exactly represent the entire population.

The model could have been strengthened by incorporating more macroeconomic variables which represent the business cycle. This would also have contributed to more accurate results. Due to focusing on Sweden in this study, this limited the amount of data available, and thus data was chosen where it was relevant and could be found.

Another limitation to note is that of the P/E ratio. The P/E ratio has a few limitations, such as the fact that it uses earnings per share which can sometimes be misleading. This is because companies can have a positive result, but still have a negative cash flow in their organization, meaning they are using and spending more money than they are generating. This can be done through varying accounting methods. However, using the P/E ratio as a variable in this study was the most appropriate, and what was most accessible.

Another important limitation to note is that in this study, only mutual funds were investigated. This in turn leads to other asset types, such as hedge funds, pension funds, and ETFs being ignored. By omitting these from the study, in particular pension funds, this may have led to a distorted picture. Also, especially since the study already does lack a bit of data on the relative sizes of these different asset management types.

Lastly, the distinction between passively and actively managed funds can sometimes be vague, and not clear. Hence our choice of filtering on passive and active management approaches in Refinitiv could be deemed as too simplistic. However, this was also the only data available for Sweden, therefore it was chosen.

8 Conclusion

The original aim of this study is to determine if recent years' popularity and large inflow of money to passive index funds has led to inflated prices in the equity market. The problem is investigated by studying the net fund flows to passive funds and comparing them to active funds over time, in order to measure if they have an effect on the market P/E ratio. Unfortunately, no such definitive statement can be made based on this analysis.

The results do not support the statement that the growth in passive investment funds and the shift in flows from active to passive funds has an effect on the overall valuation of the equity market. Due to the regression model not showing a statistically significant relationship, the claim of the so-called passive investment bubble is not likely to exist in the Swedish equities market. This conclusion is in line with the findings by Sushko and Turner (2018).

In the future, as for suggestions for further research, there is indeed much potential in investigating this topic with similar hypotheses, and similar variables. The lack of data available made it difficult in this state to gather a fully equipped data set. However, in the future, as the Swedish equity market continues to grow and expand, there may be more data available to researchers. With this in mind, potentially the true nature of the eventual relationship between inflows of capital to passive funds, and the potential happening of a bubble may be able to be fully concluded.

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Appendix A: Supplementary model tests

Appendix A1 Breusch-Pagan/Cook-Weisberg test for heteroscedasticity

With the assumption of normal error terms, the test for heteroscedastic error terms concludes based on a 95% significance level that the null hypothesis cannot be rejected, i.e., there is no presence of heteroscedasticity in the dataset.

H0: Constant variance
chi2 = 1.53
Prob > chi2 = 0.22

Appendix A2 Test for multicollinearity

Since all independent variables display a near-one VIF value, there is no significant correlation between these variables. As such, there is no multicollinearity within the model. Common benchmarks are that a VIF value of 1 indicate no correlation between the variables, values between 1-5 indicate no significant correlation, and values above 5 indicate significant correlation.

Variable	VIF	1/VIF
Passive net fund flows	1.20	0.832
Active net fund flows	1.25	0.797
Interest rate	1.17	0.853
Unemployment rate	1.11	0.899
Inflation rate	1.07	0.938
GDP growth rate	1.03	0.969
mean VIF	1.03	1.030
